Amendments to the claims

1. (Presently amended) An integrated etch and metal liner process of a substrate including a dielectric layer and covered with a patterned mask material, comprising the steps of:

a first step of transferring the substrate into a first transfer chamber held at a first pressure below atmospheric pressure;

a second step of transferring the substrate from the first transfer chamber to an etching chamber and etching according to said patterned mask material through said dielectric layer to an etch stop layer to form a hole in said dielectric ~~oxide~~ layer;

ashing said mask material;

removing said etch stop layer exposed at a bottom of said hole;

a third step of transferring the substrate from the first transfer chamber to a second transfer chamber through an intermediate load lock, wherein said first transfer chamber is vacuum isolated from said second transfer chamber throughout said third transferring step;

a fourth step of transferring said substrate ~~wafer~~ from said second transfer chamber to a metallization chamber without exposing the substrate to an atmospheric pressure;

depositing a barrier layer in said metallization chamber; and

depositing a seed layer.

2. (Original) The process of Claim 1, wherein said metal seed layer is a copper seed layer.

3. (Original) The process of Claim 2, wherein said barrier layer comprises tantalum.

4. (Original) The process of Claim 1, wherein at least one of said two depositing steps is a sputtering step.

5. (Previously presented) An integrated etch and metal liner process of a substrate including an etch stop layer covered with a dielectric layer covered with a patterned mask material, comprising the steps of:

etching according to said mask through said dielectric layer to said etch stop layer to form a hole in said dielectric layer;

ashing said mask material;

removing said etch stop layer exposed at a bottom of said hole;

a first step of transferring said substrate to a first transfer chamber maintained at a sub-atmospheric pressure;

a second step of transferring said substrate from said first transfer chamber to a second transfer chamber through an intermediate load lock, wherein said second transfer chamber is isolated from said first transfer chamber throughout said second transferring step;

in a reactor coupled to said second transfer chamber, depositing a barrier layer; and

in a reactor coupled to said second transfer chamber, depositing a metal seed layer;

wherein said substrate is maintained between said etching, ashing and removing steps and throughout said transferring steps at sub-atmospheric pressures.

6. (Original) The process of Claim 5, wherein said barrier layer comprises tantalum.

7. (Original) The process of Claim 5, wherein at least one of said depositing steps is a sputtering step.

8. (Currently amended) Original) The process of Claim 5, wherein said second transfer chamber is maintained at a pressure of less than 10^{-6} Torr.

9. (Previously presented) An integrated etch and metal liner process of a substrate including a stop layer covered with an oxide layer covered with a patterned photoresist mask,

comprising the steps of:

a first step of transferring said substrate into a first transfer chamber maintained at a first pressure of no more than 1 Torr;

a second step of transferring said substrate from said first transfer chamber to an oxide etch reactor;

in said oxide etch reactor, etching said oxide layer according to said mask to form a hole in said oxide layer;

a third step of transferring said substrate from said oxide etch reactor through said first transfer chamber to a second transfer chamber isolated from and first transfer chamber throughout said third transferring step and maintained at a second pressure less than said first pressure; and

a fourth step of transferring said substrate from said second transfer chamber to at least one reactor to deposit a layer in said hole.

10. (Original) The process of Claim 9, further comprising ashing said photoresist layer in said oxide etch reactor.

11. (Previously presented) The process of Claim 9, further comprising:

a fifth step of transferring said substrate from said oxide etch reactor through said first transfer chamber to a plasma ashing reactor attached to said first transfer chamber; and

in said plasma ashing reactor, ashing said photoresist layer;

wherein said third step of transferring comprises transferring said substrate from said plasma ashing reactor through said first transfer chamber to said second transfer chamber.

12 – 13. (Canceled)

14. (Previously presented) An integrated process performed in processing reactors

connected to first and second central vacuum transfer chambers held at pressures of no more than 1 Torr, said first and second central vacuum transfer chambers being linked by a doubly gated vacuum passageway, said processing reactors, said first and second central vacuum transfer chambers, and said vacuum passageway being formed on a single platform, said process comprising the steps of:

loading into said first central vacuum transfer chamber through a load lock a substrate having a dielectric layer covered by a patterned resist material;

in at least one etching reactor connected to said first central vacuum transfer chamber through a respective slit valve, etching said dielectric layer in said substrate according to said patterned resist material to form a hole therethrough and thereafter ashing said resist material;

transferring said substrate through said doubly gated vacuum passageway from said first central vacuum transfer chamber to said second central vacuum transfer chamber while continuing to vacuum isolate said first and second central transfer chambers from each other;

in at least one deposition reactor connected to said second central vacuum transfer chamber through a respective slit valve, depositing a liner layer on sides of said hole;

wherein said substrate is not exposed to atmospheric pressure between said etching step and said depositing step.

15. (Original) The process of Claim 14, wherein said liner layer includes a barrier layer and a copper seed layer.

16. (Original) The process of Claim 14, wherein said at least one deposition reactor includes a sputter reactor with a copper target for depositing said copper seed layer.

17. (Original) The process of Claim 14, wherein said at least one etching reactor includes an etch reactor for etching said dielectric layer and an ashing reactor for ashing said resist material.

19. (Previously presented) The process of Claim 14, wherein said at least one etching reactor includes an etch reactor for etching said dielectric layer and an ashing reactor for ashing said resist material and wherein said at least one deposition reactor includes a first sputter reactor for depositing at least a part of a barrier layer and a second sputter reactor for depositing a copper seed layer.

20. (Previously presented) The process of Claim 14, wherein said second central vacuum transfer chamber is held at a pressure of no more than 10^{-6} Torr.

22. (Previously presented) The process of Claim 1, wherein said etching is performed using a fluorine-based chemistry.

23. (Previously presented) The process of Claim 1, wherein said intermediate load lock is doubly gated and includes a pedestal for supporting said substrate which is accessible by two substrate-handling robots located respectively in said first and transfer chambers, whereby said first and second transfer chambers are vacuum isolated from each other during transfer of said substrate through said intermediate load lock during said third transferring step.

24. (Previously presented) The process of Claim 5, wherein said etching step uses a fluorine-containing etching gas.

25. (Previously presented) The process of Claim 5, wherein said intermediate load lock is doubly gated and includes a pedestal for supporting said substrate which is accessible by two substrate-handling robots located respectively in said first and second transfer chambers, whereby said first and second transfer chambers are vacuum isolated from each other during transfer of said substrate through said intermediate load lock during said second transferring step.

26. (Previously presented) The process of Claim 9, wherein said etching step uses a fluorine-containing etching gas.

27. (Previously presented) The process of Claim 9, wherein said first and second transfer chambers are isolated by a doubly gated load lock through which said substrate is transferred in said third transferring step.

28. (Previously presented) The process of Claim 14, wherein said etching step uses a fluorine-containing etching gas.

29. (Previously presented) The process of Claim 23, further comprising throughout said third transferring step:

maintaining said first transfer chamber at a first pressure; and

maintaining said second transfer chamber at a second pressure lower than said first pressure.

30. (Previously presented) The process of Claim 25, further comprising throughout said transferring step:

maintaining said first transfer chamber at a first pressure; and

maintaining said second transfer chamber at a second pressure lower than said first pressure.

31. (Previously presented) The process of Claim 27, further comprising throughout said third transferring step:

maintaining said first transfer chamber at a first pressure; and

maintaining said second transfer chamber at a second pressure lower than said first pressure.

32. (New) The process of Claim 1, wherein said steps are sequentially performed in the stated order.

33. (New) The process of Claim 5, wherein said steps are sequentially performed in the stated order.

34. (New) The process of Claim 9, wherein said steps are sequentially performed in the stated order.

35. (New) The process of Claim 14, wherein said steps are sequentially performed in the stated order.

36. (New) An integrated etch and deposition process of a substrate including a dielectric layer and covered with a patterned mask material, comprising the sequentially performed steps of:

a first step of transferring the substrate into a first transfer chamber held at a first pressure below atmospheric pressure;

a second step of transferring the substrate from the first transfer chamber to an etching chamber attached to said first transfer chamber and etching said dielectric layer according to said patterned mask material to form a hole in said dielectric layer;

a third step of transferring the substrate from the first transfer chamber to a second transfer chamber through an intermediate load lock, wherein said first transfer chamber is vacuum isolated from said second transfer chamber throughout said third transferring step;

a fourth step of transferring said substrate from said second transfer chamber to a first metallization chamber coupled to said second transfer chamber through a first slit valve without exposing the substrate to an atmospheric pressure;

depositing a first metal layer on said substrate in said first metallization chamber.

37. (New) The process of Claim 36, further comprising the subsequent steps of:

a fifth step of transferring said substrate from said first metallization chamber to a second metallization chamber coupled to said second transfer chamber through a second slit valve without exposing the substrate to an atmospheric pressure; and

depositing a second metal layer on said substrate in said second metallization chamber.

38. (New) The process of Claim 37, wherein said first metal layer is a barrier layer and said second metal layer is a copper seed layer deposited by physical vapor deposition.

39. (New) The process of Claim 36, further including ashing said mask material in a reactor connected to said first transfer chamber prior to said substrate being transferred into said second transfer chamber.